Installation Manual
Yamaha
Stratoliner/Roadliner
Version 2

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Introduction

This manual covers installation of the LegUp Landingear system by Chopper Design Services. This system should only be installed by a qualified technician, or those with above average mechanical skills. If you are not SURE that you can perform this installation, please contact us and we will help you find a qualified shop to assist you.

If you have been looking for a system that will keep your feet on the pegs, this is NOT the system for you! On the other hand, if a system that will relieve you of the weight of the bike and help you avoid balance problems as you approach a stop, LegUp is what you need.

Improper installation will void your warranty, so please be very careful!

Thanks for choosing LegUp!

Warranty

Chopper Design Services warrants the LegUp system for a period of one year from date of purchase. This warranty covers replacement parts and/or manufacturer defects. Incidental damages or costs are the responsibility of the purchaser.

Defective parts are to be returned to Chopper Design at the address below. Purchaser must contact Chopper Design to receive a Return Material Authorization, prior to returning defective parts to Chopper Design.

Abuse, improper installation or use, collisions or accidents, are not covered under this warranty. Replacement parts for this type of damage are available through Chopper Design.

Users of the LegUp system agree that Chopper Design is NOT responsible for personal injuries or damage to property arising from the use of the system. While we believe this system to be safe and reliable, the user is advised that use of LegUp is done so at the users' own risk. Use of the system implies agreement to the above statements. If you can't agree with the above, Chopper Design and its dealers would be happy to refund your full purchase price, before you use the LegUp System.

Chopper Design Services
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Longwood, FL 32750

407-834-5007
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Installation Instructions

The LegUp® system has many components. Pleased be sure you have them all before starting your installation.

COMPONENTS:

1) **Control Switch Box**

2) **Linear Actuator**

3) **On-board Computer Module**

4) **Proximity Sensor**

5) **Leg Support Stand**

6) **Leg/Wheel System**

7) **Hardware Bag**

8) **Actuator Bracket**

If you believe you are missing any parts, please contact Chopper Design at 407-834-5007, and we will rectify the situation.

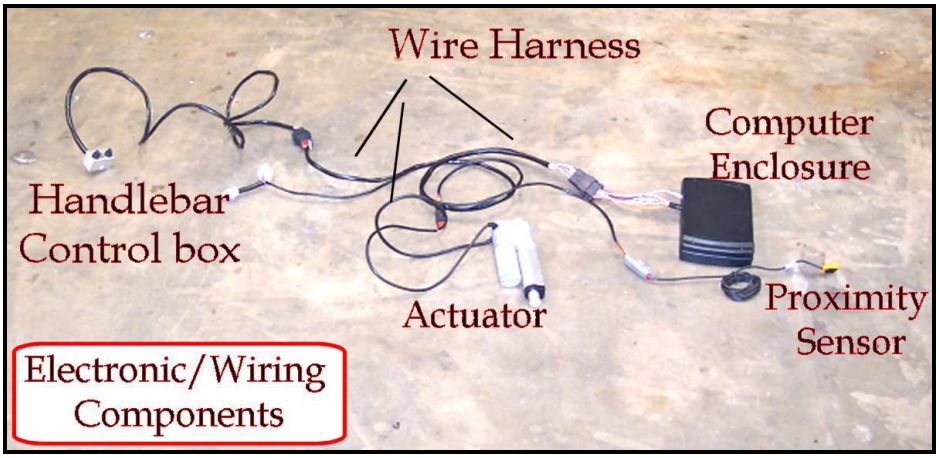


Figure 1

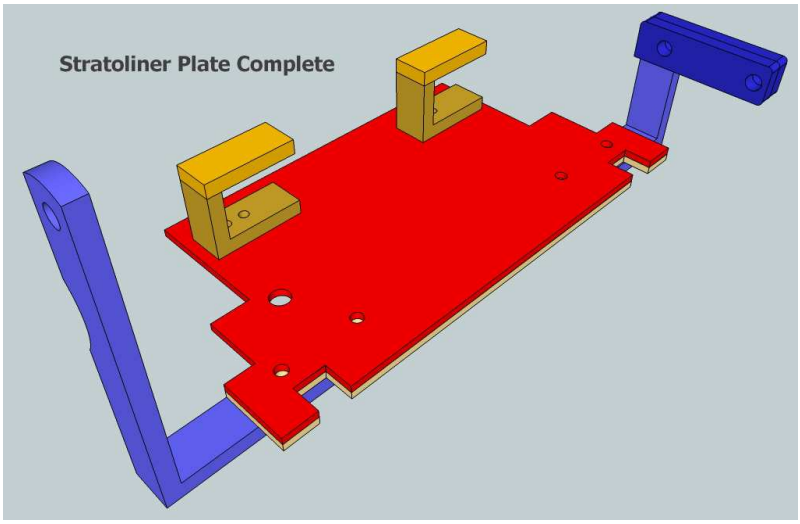
PREPARE FOR INSTALLATION

Place the motorcycle on an acceptable bike lift. You will need to keep the bike on its wheels for most of the installation, and jack the rear wheel off the lift for some portion of the installation. Make SURE the motorcycle is secure on the lift!

Remove the seat, saddlebags and side covers, they are not needed until the very end of the installation.

We are now ready to begin!

INSTALL LEG SUPPORT STAND



LegUp has developed a new, stronger attachment system which holds the Leg system to the bike! You will need to remove the two Exhaust Bolts from the exhaust bracket on the right side in order to install the support stand. These Bolts are replaced with two from the kit. Remove the Black button-head bolt from the left side of the bike, directly below the left foot peg. This bolt will also be replaced.

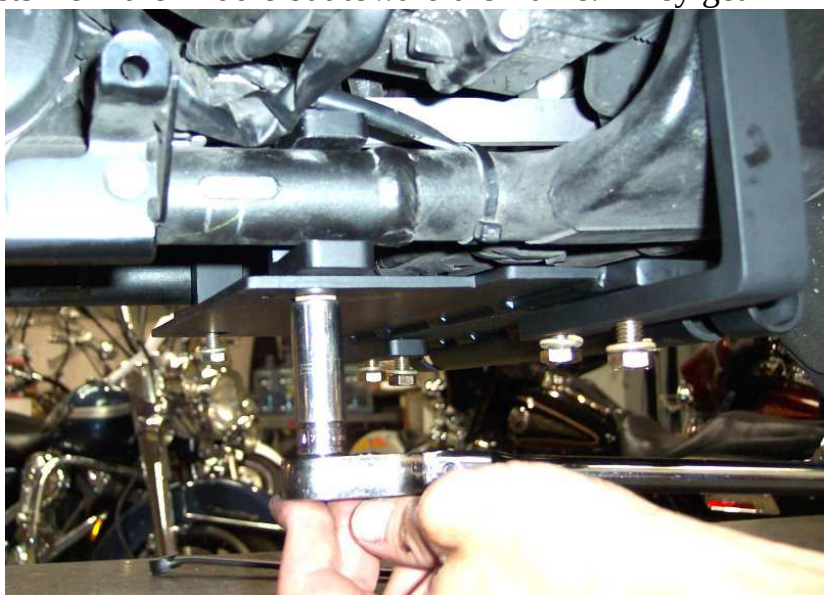
If inserted into the stand, the long stainless steel shaft with the small bolts in the end should have one of the bolts removed, and be slid out of the pipe in the stand. Just set this aside for now.

The first step is to install the right upright described above, outside the exhaust bracket and frame. The spacer goes to the inside (may be welded in place already) against the exhaust bracket then the 90 degree bracket outside with two bolts supplied. Get the bolt holes to line up, and install the bolts (with a bit of blue Locktite on the bolts) loosely. The other, longer 90 degree bracket (the one with the rounded relief on it) is hung from the left side of the bike next where you removed the button-head bolt earlier. Again, some Locktite and keep the bolt loose for now!

Now we want to slide the support plate (red above) with the reinforcement plate (welded on thicker part) facing the ground, under the bike and supported by the uprights you just mounted. The four 3/8” bolts and lock washers you likely just removed from this plate get a bit of blue

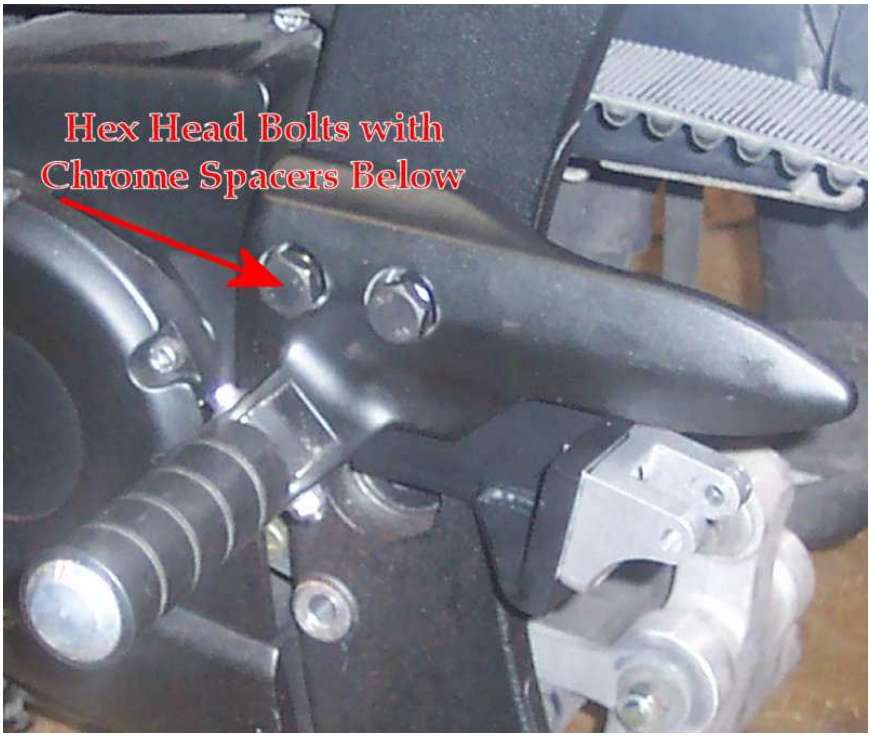
Locktite, and get lined up from the bottom of the ‘L’ brackets into the threaded holes of the support plate (picture left). Gets these bolts just barely started to give us flexibility for the next step.

You will find two ‘U’ shaped brackets in the box. Take these brackets and slide them on the top of the plate you just installed. These get oriented with the open side facing out and the threaded hole toward the plate. Slide these brackets from the middle out toward the frame. They get lined up so the slots in the plate (not the holes) get lined up with the threaded holes in the ‘U’ brackets. You may find some wires and wire ties get in the way of putting the ‘U’ brackets where you want. Simply cut the ties and gently move the wires out of the way to allow you to bolt these brackets into place (picture right). As you can see the ‘U’ bracket straddles the frame. This keeps the support plate from rotating under load. Now Line these up square on each side, and tighten the 5/16” screws (Locktite please!) little-by-little until they are VERY snug! Once they are, you can tighten the four bottom bolts left loose before, then the exhaust bracket bolts and the bolt on the left upright! Once complete, the Plate system should be very tight to the bike and not be able to move.



Once the support stand is installed, tighten the bolts that attach the exhaust to the motor. The Upper Actuator Bracket is next!

ACTUATOR BRACKET

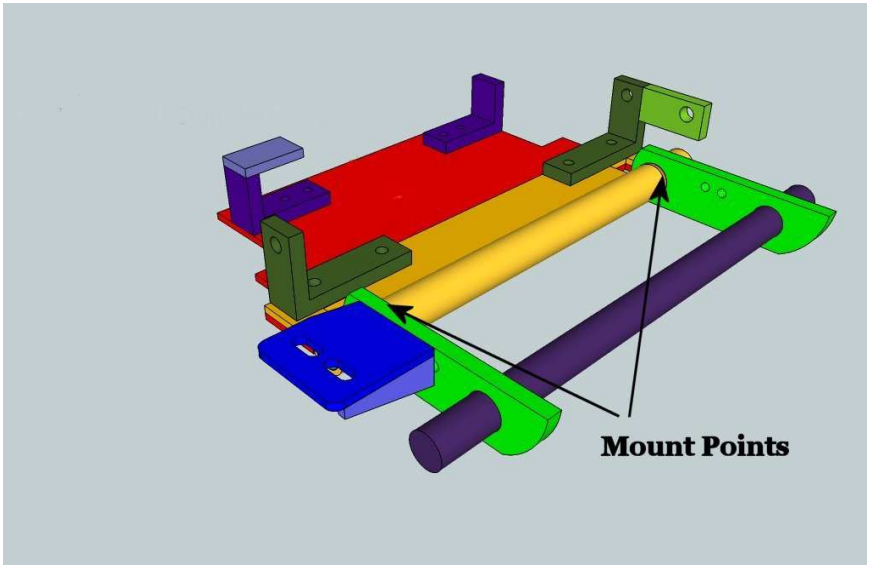


The actuator bracket mounts to the vehicle on the bolts that hold the left foot peg to the bike. Remove these two bolts and the plate. These bolts are not re-used. Find two long hex-head bolts with chrome washers, put some blue Locktite on these bolts, guide them through the spacers, then the stock bracket, then the holes on the actuator bracket.

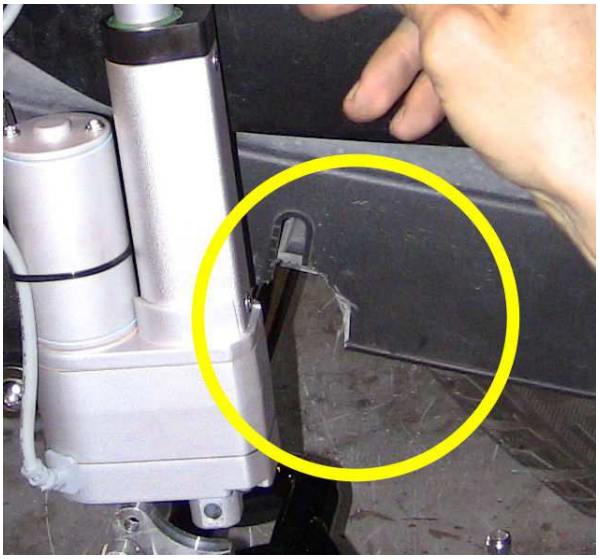
Attached to this bracket is the upper actuator mount (brushed aluminum) with the upper actuator axle. This mount is tightened at the factory. The chrome bolt and nut will be removed to mount the actuator.

The next step is to mount the leg system!

LEG/WHEEL ASSEMBLY



If not completed already, first remove the bolts from the stainless steel rod in preparation for mounting the legs. With help from an assistant, slide the Leg/Wheel Assembly around the rear tire (careful of the finish!), and align the Leg Mounting Points (green) with the slots in the Support Stand. If available a very small amount of 'Never Seize' on the shaft is in order here. Then start the stainless steel shaft in from one side through the tube on the support stand, and through the first leg mounting point and its bushing. The fit is tight, so take your time. Carefully work the shaft through the tube and the second leg mounting point. The shaft is inserted properly when there it is inserted just past (approximately 1/8") the end of the tube. This distance should be about the same on both sides, but it is not critical as long as both sides are inside the tube. If you need to, you can tap lightly on the shaft (brass drift is preferred here). Once the shaft is in place, use a small amount of blue thread locker and install the (2) chrome bolts and washers on the end of the shaft to finish it off. Make sure the legs move up and down without any binding!



There is an optional step here. In order to allow the legs to come up higher, we like to clearance the plastic belt guard. The higher the legs come up, the more clearance you will have in sharp turns. We used an air saw to cut out this small notch. You can use almost anything; the plastic is soft. Just raise the legs by hand to determine how much to cut. If you give it all the clearance it needs, the up stop of the legs will be on the right side, not on the belt guard.

This change will have no negative effect on the belt guards' function.

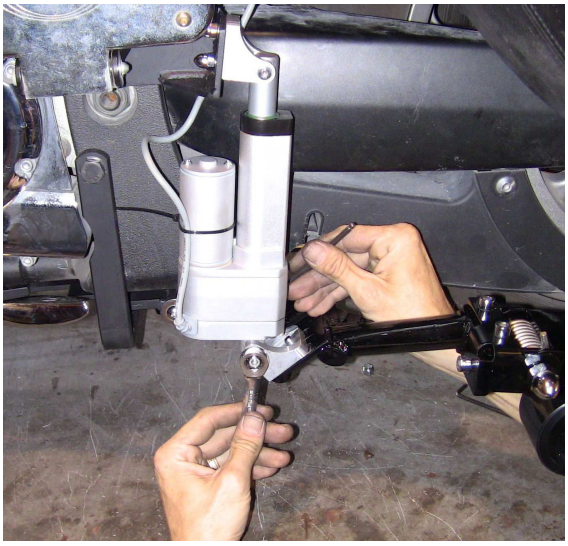
MOUNT ACTUATOR

Remove the axles from both the upper and lower actuator mounts (aluminum blocks - one on the legs and one on the upper actuator mount by passenger peg), and set them aside. Both actuator mount axles are chrome bolts with Nylock nuts. Align the actuator, motor side (big end) down with the hole in the upper actuator mount.

Reinstall the axle bolt from the outside of the bike in, and install the Nylock nut on the inside. Tighten the nut as shown to the right.

With someone supporting the wheel assembly, raise the legs until the bottom hole in the actuator is aligned with the lower actuator mount (which uses bolts from underneath to hold it on… these bolts should be snug, but can be loosened later if adjustment is required!). Install the axle in this mount from the inside to the outside (some wiggling may be required!) and tighten the Nylock.

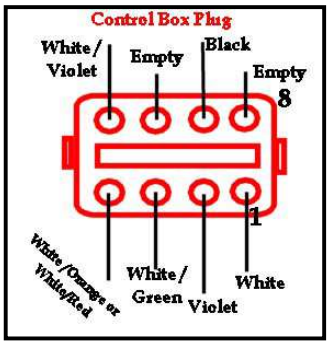
NOTE: If the actuator is too short to reach the other mount you may have to lengthen it using the system. Temporarily plug the wiring harness into the bike, and follow the direction for 'Maintenance Mode' in the 'Initial System Test' section below. Using what would be the left button on the switch box, just add a small amount of length to the actuator so you can align the mounts, then turn the bike back off.



At this point you need to make sure that the mounts are in alignment and the actuator is not in any sort of bind! The mounts should be tightened at the factory. If need be readjust the actuator mounts in whatever position is the best with the actuator in its mounts. If needed, mark the mounts with a Sharpie, remove the actuator, tighten the mounts and reinstall the actuator. Make sure the axles slide in easily and there is no bind at all. **MAKE SURE** there is no bind or the actuator will fail prematurely!

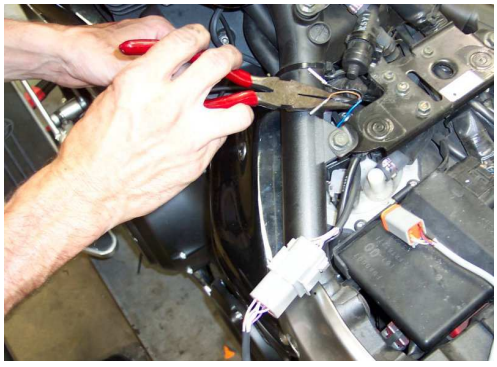
CONTROL SWITCH BOX

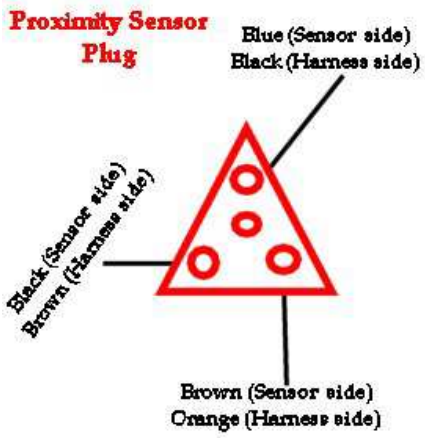
NOTE: If you have a LITE System, Please refer to the addendum at the end of this manual, for differences between a Regular and LITE system. The LITE System does NOT have a Proximity Sensor! Ignore all references to the Proximity Sensor, Its' mount & wiring.



Disassemble the 8-pin connector attaché to the switch housing and the 3 pin connector attached to the speed sensor (yellow on a black bracket). Because the wire run to the seat area is so long on this bike, we want to run both of these wires to the seat area, reassemble the plugs and then mount the switch housing. Run the wire from the speed sensor bracket up to the tank area to join the switch wires. See the pictures below and run the wires for the switch housing from in front of the handlebar, down in front of the top triple tree and then join the other wire and run them BOTH around and under the left side of the tank to the seat area. Take all the slack you need so you can easily reassemble these plugs **(wire diagrams: switch top left, speed sensor bottom right)** under the seat area (below, left). Then you can pull the excess slack back to install the Handlebar control & the speed sensor bracket.

Find the long black bolt and spacer. Remove the bolt from the left switch housing. Put the bolt through the hole on the switch bracket, then the spacer, then into the switch housing and tighten (center picture below).





WIRING HARNESS

NOTE: If you have a LITE System, Please refer to the addendum at the end of this manual, for differences between a Regular and LITE Harness!

The next step is to route the wiring harness. The harness and the plugs are routed mostly under the seat area cover. We already ran the wires from the handlebar switch and the speed sensor. The actuator wire should be run under the seat area behind the fender support (self-adhesive straps are included to secure wire away from swing-arm and belt). Make sure to leave enough slack in the wire to allow the actuator to lower the legs completely without tugging on the wire here.

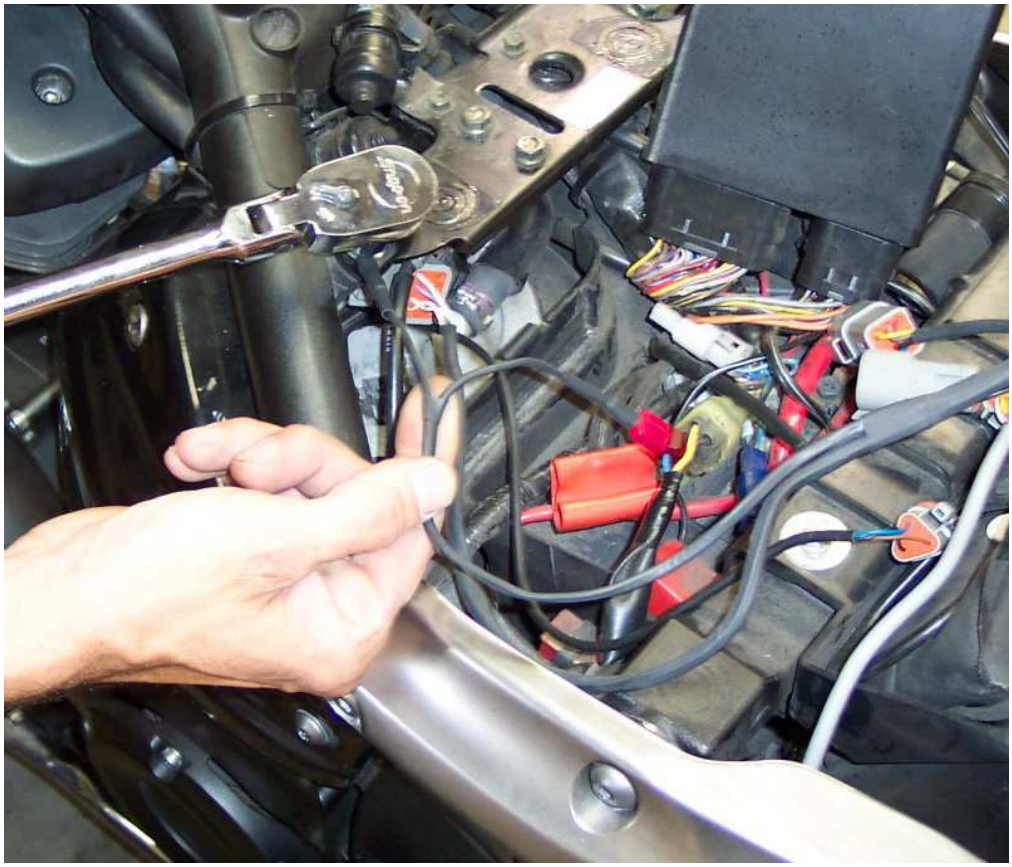
Now take the harness and find the 12-place plug. This needs to be routed near the saddlebag from the seat area Picture left… notice the grey wire which is the actuator plug plugged together already!). The rest of the harness should have mating plugs waiting under the seat for them. Find each plugs mate, they only plug in one way, and plug them together.

The Proximity sensor is not mounted yet because we need to have power to make sure it is placed perfectly, so just route the wire for now. You can collect any excess wire under the side cover when the time comes.

Next we need power for the system. There is a black box looking thing with lots of wires that can be lifted. Beneath it lays a Yellow plug. Find the blue wire connected to it and install the crimp plug supplied around this wire. Close the plug and use pliers to click it closed. This makes a female spade plug (picture at right).

Connect the orange plug to this, then remove the left bolt from the seat plate, and re-install the bolt with the black wire and its' hoop connector, back into the hole for a ground. The picture below shows us tightening this bolt back in place.

Plug the computer enclosure plug in its mating connector as well. Just lay the enclosure on the lift or support it somewhere… Don't dangle it by its cord! Don't worry, the plugs only work one way… you can't make a mistake here!



Don't tie down the wires just yet but if you have all the plugs connected, we can do a quick test of the system. There are 2 things we want to check here. We want to make sure the controls work, and we want to check the light on the proximity sensor is functioning.

INITIAL SYSTEM TEST

NOTE: If you have a LITE System, Please refer to the addendum at the end of this manual, for differences between a Regular and LITE system. Skip this section if you have a LITE System.

Turn your key switch on. At this point, have a look at the yellow proximity sensor (it should be dangling near the front forks somewhere). The LED ***Should Not Be Lit***. Take a metal object (screwdriver, wrench, etc) and hold it on the flat face of the sensor (it has a circle embossed in it). The LED should light up, and go out when you move the metal away. If not, check all your connections.

Next, press the rightmost pushbutton on the switchbox, and hold it for at least 3 seconds. One or both LEDs on the switch panel should light up; we really don't care which at this point. If this occurs, you are doing well. If both LEDs are flashing (maintenance mode) you can skip the next step which is to press both buttons until both LEDs flash.

Next press both buttons for just an instant! If everything is working, the bottom or yellow LED on the switch box should flash, and the top LED should be out. The next step, and be careful here, is to touch the left button for a split second. The legs should move down just a bit. Touch the right button, and they should move up. With the bike on the lift, ***you have to be very careful here!***

If all of the above has occurred, raise the legs. Press and hold the right button until it or is as high as you wish, and turn the ignition switch off!

The test is now complete. Let's move on to mounting the Proximity Sensor.

MOUNT PROXIMITY SWITCH

NOTE: If you have a LITE System, Please refer to the addendum at the end of this manual, for differences between a Regular and LITE system. Skip this section if you have a LITE System.

This step is crucial!! Understand it before starting. The proximity sensor tells the system how fast the bike is traveling. The proximity sensor mounts to the lower front brake mounting bolt. The sensor will ultimately be mounted 5MM from the rotor bolts.

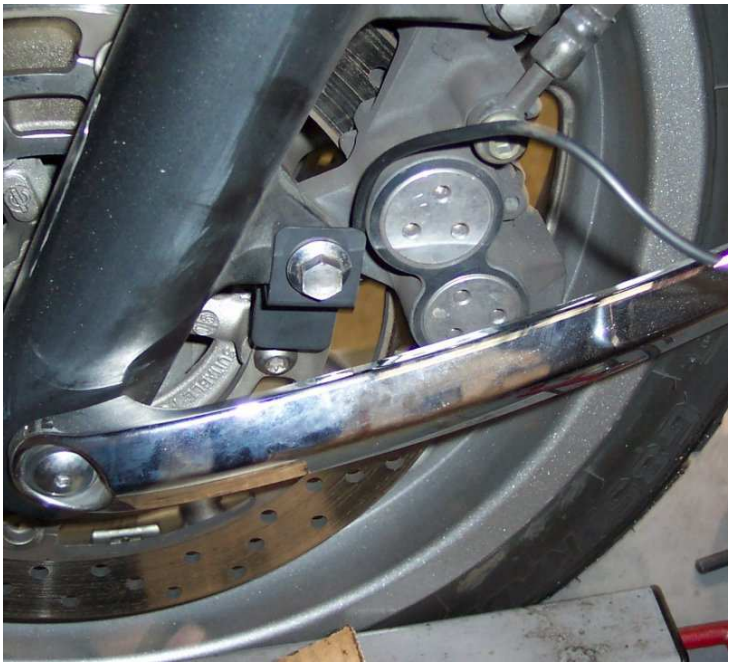
Remove the lower front brake mounting bolt and put the bolt through the proximity (speed sensor) bracket as shown to the left. Make sure you have the wire where you want it to route up the brake line or you will get to do this twice!

With a bit of Locktite, reinstall the bolt leaving it just barely tight for now. We want to make sure the wires will run properly and can be tied off to the brake line to disappear (picture below)!

Now have a look at the bracket and the yellow sensor (red LED should be visible from the front). The yellow sensor should be within 5MM of the rotor bolts as they spin.

Now we need to have the bike on the ground so we can roll the bike to test the sensor and its placement. Make sure the bike is in neutral.

With the bike on the ground as described above, turn the ignition switch to the on position. The LED may or may not be on. What we are looking for here is for the LED to light as a rotor bolt passes close to the sensor and to go out as the bolt passes by. Have someone watch the LED as you roll the bike back and forth making the bolts pass close to the sensor.



Once you feel you have the right place, tighten the brake bolt down securely, and test again!

If this is not happening, you may need to get the sensor a bit closer to the bolts (5MM is a very small distance!). If you have to move the sensor closer, you may have to bend or adjust the angle of the bracket.

No matter what you need to do, you MUST make sure that as the wheel turns, the light works as described above! The automatic retraction of the legs as well as their deployment RELIES on this sensor being placed perfectly!

Once satisfied with the mount, skip down to the wire routing instructions below.

WIRE ROUTING

NOTE: If you have a LITE System, Please refer to the addendum at the end of this manual, for differences between a Regular and LITE system.

Guide the wires from the Proximity bracket up the brake line, and attach it to the line with wire ties. Once routed, make sure both this wire and the wires from the handlebars are secure and allow full lock of the handlebars both left & right! Take whatever extra slack from the two wires that is available, and pull it back to the seat area!

Unplug the Computer Enclosure from the harness, and using the Velcro, attach the enclosure with the wires facing down. Once the enclosure is attached, make sure closing the bag does not crush this wire. Use the self adhesive wire holder to guide the wire up and out of the bag as you see fit. Now pull any excess wire back in under the seat.

Use wire ties to make sure that all wires will stay where you put them and that they will not come on contact with the belt or anything else that moves Keep the excess wire clean and make sure the seat goes on and off without hitting any wires.

With help, support the bike and turn on the LegUp system (see owners manual). It should start in maintenance mode, but if it doesn't, please enter maintenance mode (again in the manual). Now carefully, lower and raise the legs and make sure the wires are not binding and that they clear everything! Raise the legs most of the way and turn off the bike. Now we are ready to button everything up.

FINISHING UP

Now it is time to recheck everything! Check that all bolts that were loosened are tight. Reinstall the side cover and the bags; making sure that everything is clear. Reinstall the seat making sure all your wires are routed neatly, tied off nicely and don't interfere with the seat installation.

Now you can dial in the actuator, and adjust the wheels.

ACTUATOR ADJUSTMENT (Maintenance Mode)

NOTE: If you have a LITE System, Please refer to the addendum at the end of this manual, for differences between a Regular and LITE system. Skip this section if you have a LITE System.

Once you have the bike on the ground, turn the ignition to the accessory position and start the LegUp System (hold right button for 3 seconds). The system should enter maintenance mode automatically (Both LEDs Flash), but if it does not, enter maintenance mode manually (Both buttons for 3 seconds). With a helper nearby, straddle the bike, and hold it level. Hit both buttons for an instant to get the system in the "DOWN" setting mode (yellow LED flashing). Straddle the bike so your weight is NOT on the seat, hit and hold the left button until the wheels contact the ground and stop. Make sure that the suspension raises a bit as you do this. If not, the legs are not going down far enough, the bottom actuator mount may need to be moved left or right a bit to get the wheels all the way down (Contact LegUp for assistance if you need help with this). Once these wheels are down as described above, try to put both feet on the floorboards. The bike should be reasonably stable and you should be able to lean a bit in both directions without the bike falling over. The DOWN stop is now set!

Hit both buttons for a moment to get into the "UP" stop mode (top LED blinking).

Carefully use the right button to raise the legs. Have your helper let you know as you approach anything that may come in contact with the wheels or the legs. You also need to make sure the system clears pipes, clamps etc. If you can't make the clearance to allow the legs to come up all the way, you can set the up stop just below whatever is interfering (if not, you will likely set up a permanent rattle!) Hit both buttons when complete, and you will be done with these adjustment.

Now press the left button and the legs should lower. Hit it again and the legs should retract. If you are satisfied with these limits, you have successfully installed the LegUp System. Time for a test ride!

TEST RIDE

NOTE: If you have a LITE System, Please refer to the addendum at the end of this manual, for differences between a Regular and LITE system. Deployment and Retraction of the wheels is COMPLETELY MANUAL if you have a LITE System.

Get the bike to a clear paved mostly level area where you can test ride it. Start the bike, turn on the LegUp system and lower the legs. The first test should be done in a straight line. Put the bike in gear and slowly accelerate. You may notice that the bike tends to want to steer a small amount left or right. This is normal unless it is severe. Once underway, the top LED should flash at around 6 MPH, meaning the legs are retracting. You can lean on one wheel or the other as you leave to reduce any darting the system may be giving you.

Assuming the legs are retracted, you should try to deploy the wheels. As you come to a stop, the Green LED should be on. As you slow down (**almost stopped**), the Yellow LED should illuminate at the proper speed. Once it does (sometimes hard to see), hit the left button and put your feet down near the ground. The top LED should flash and you should soon feel the wheels deploying underneath you! Make sure you are ready to balance the bike! Uneven ground or lack of familiarity could make the bike want to lean one way or the other. With your feet ready to balance the bike, this should be no big deal. The slower you are going when deploying the wheels, the smoother the transition will be from wheels up to wheels down. Practice these maneuvers until you are comfortable with the wheel adjustments and the system operation.

SEMI-AUTOMATIC DEPLOYMENT: Another way to deploy the legs is to hit the left button while you are running at any speed over 10MPH with the wheels up. The bottom or yellow LED should start to flash. When you slow down to around 8MPH the wheels will start to deploy (see the red/green flash on top LED). Again prepare to put your feet down.

NOTE: The bottom LED Should not be LIT if the legs are up over 10MPH! In the event it is, the wheels will deploy instantly if you try to set them as above; this is dangerous! You MUST re-visit the sections on testing the proximity sensor. You should always be aware that this light should NOT be on if you are traveling at speed, and 'Arming' the system for deployment should only be attempted if the lower LED is Not Lit! Please see the User Manual for more information on Proximity Sensor Failure!

The next thing to try is to make a turn right after a dead stop with the wheels down. As soon as you start the bike moving, try a left or right turn immediately by leaning into that turn. You may find that you have to nudge the bike a little bit more than usual to get the bike to lean, and you won't be able to lean as far as you can with the wheels up. Once into the turn, accelerating will raise the wheels. You will hardly notice the wheels coming up unless you see the top LED blinking!

The next thing to try is slow speed maneuvering with the wheels lowered. In a straight line on level ground, you should be able to keep your feet on the floorboards and move the bike forward at very slow speeds (simulate stop and go traffic). I like keeping my feet near the ground during these maneuvers! You can also try small 'Trike' turns; keeping the bike upright at slow speed and making turns as you would in a parking lot. Be aware that if you get over the speed that the legs come up, they will!!! Another thing I like to do is donuts. Start out slow, lean the bike left or right, and make circles at very slow speeds (throttle on, rear brake on, clutch slipping… you know like the cops do!). This helps you get familiar with the wheels being on the springs and allowing a lean angle! Practice, practice, practice!! Enjoy your LegUp System!

LEGUP LITE - ADDENDUM

If you have a Lite System, there are a few differences in the wiring compared to our Regular system.

The plugs and their locations don't change at all! Instead of plugging in the computer to the twelve pin plug, the Relay-Pack gets plugged into this plug. The Relay-Pack will be attached with Velcro as the computer would have been in the same location.

On the LITE system there is no proximity sensor, so ignore the testing and mounting of this sensor, and realize that the three pin plug will be left without a mating connector. We keep this plug in the wiring harness in case you upgrade to a regular system in the future.

Using Your Lite System:

Unlike our Regular System, you don't turn the **LITE** system on, or adjust the legs as described in the **'Maintenance Mode'** section of the manual. When you turn your bike on, the LITE system is ready to go! Press and hold the left button to lower the wheels, press and hold the right button to raise them. No lights will flash; it is up to you to control the system manually!

Please use EXTREME Caution when using the LITE System! Keeping the wheels lowered at speeds over 9MPH can be dangerous. Since the system is manual, please don't allow its' operation to distract you from controlling the vehicle!

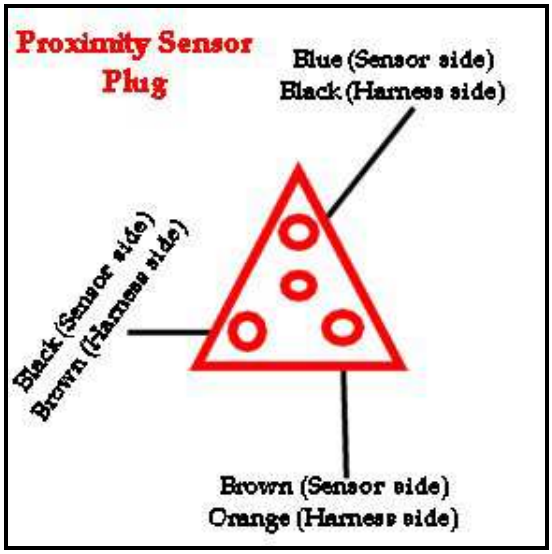
Upgrading Your LITE System:

If you have a LITE System and have chosen to upgrade it to the regular system, there are just a few things you need to do. Unplug the Relay-Pack, and plug the computer in where the Relay-Pack was attached. Run the wire for the proximity bracket and plug it in, test it, and mount it, as described in the '**MOUNT PROXIMITY SWITCH'** section of this manual.

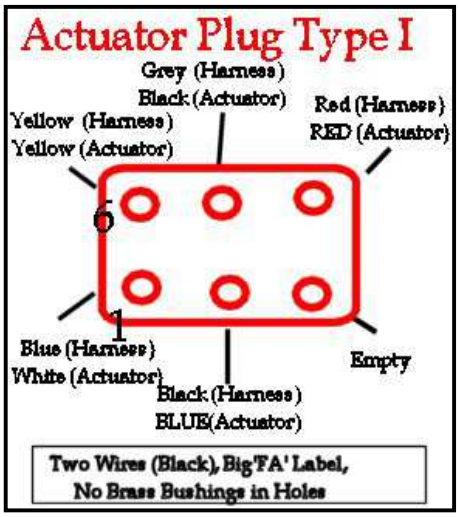
Once the new pieces are attached and plugged in, refer to '**ACTUATOR ADJUSTMENT (Maintenance Mode)',** earlier in this manual to set the lower and upper stops for the computer.

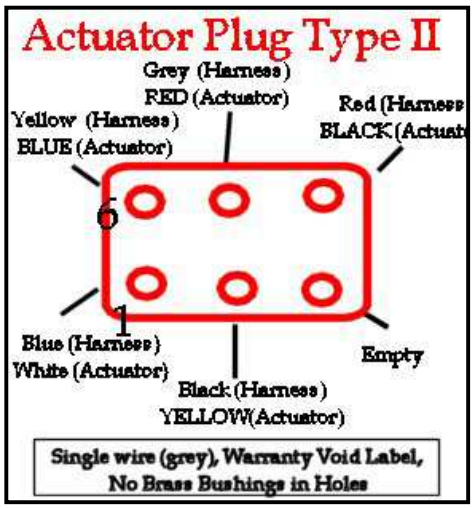
That's all it takes!

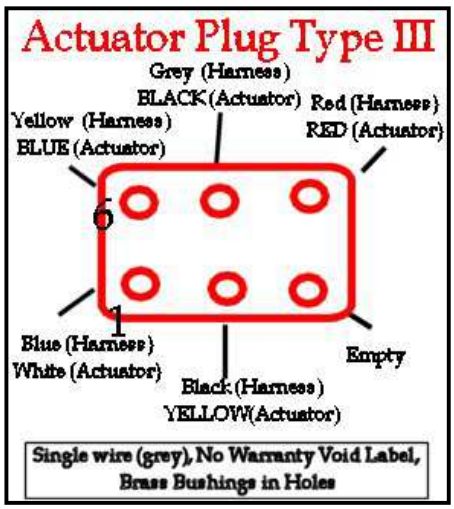
ILLUSTRATIONS



Wiring 1

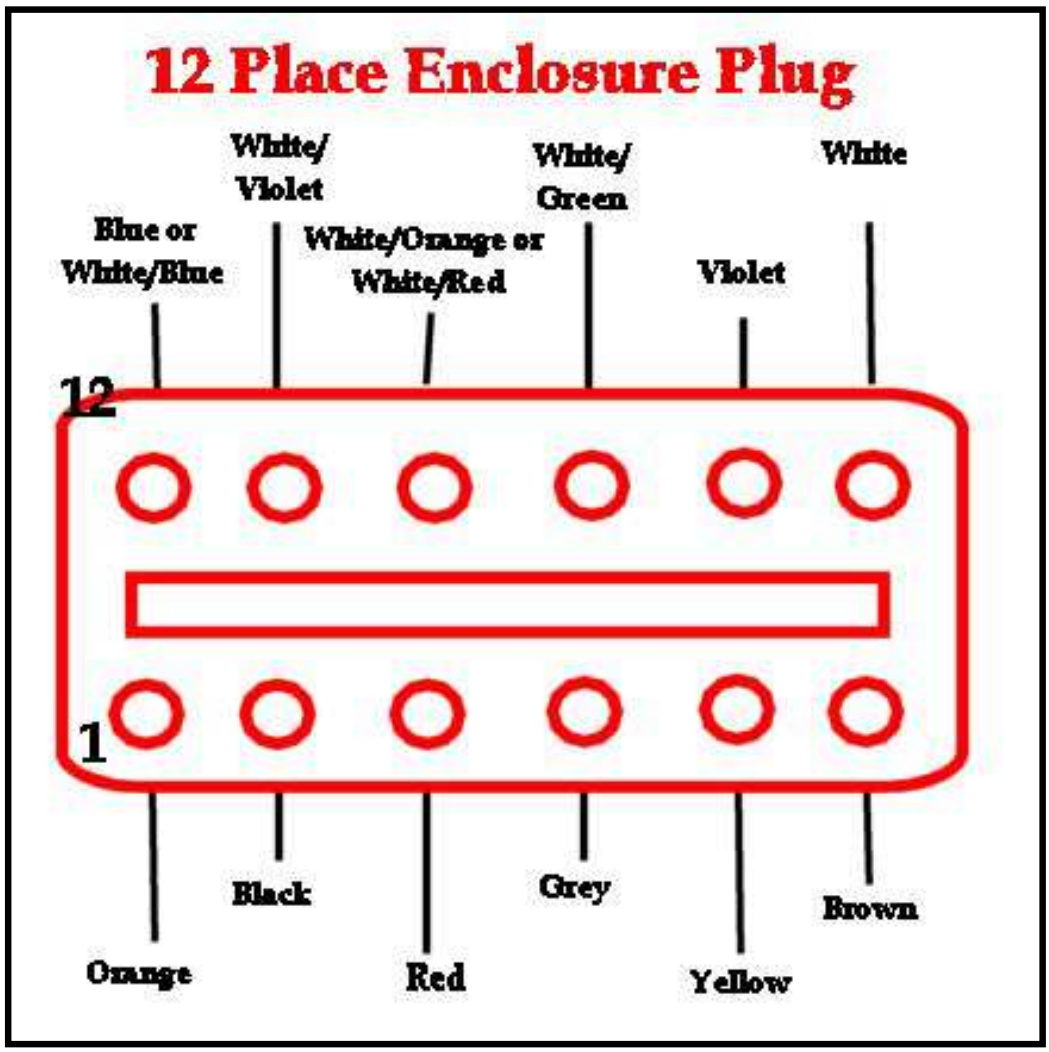






There are three different types of actuators with three different wiring configurations. Refer to the notes at the bottom of the pictures above so you can match your actuator with its wiring scheme!

Wiring 2


12 Place Enclosure Plug
White/
Violet
White/
Green
White
Blue or
White/Blue
White/Orange or
White/Red
Violet
12
1
Orange
Black
Red
Grey
Yellow
Brown

Wiring 3

PARTS LIST

(4) 3/8-16 X 1” Cad Bolts w/ Lock Washers
(2) 5/16 – 18 X 3/4” Cad Bolts w/Lock & Flat Washers
(5) M10 x 45mm Black Hex Bolts **(Uprights & Upper Actuator Bracket)**
(1) 7/16” x 1/4” x 1 1/16” Chrome Spacer (Handlebar)
(1) M5 X (CUT) 2 5/16” Black Allen Bolt (HB Bracket)
(2) 11/16” OD x 7/16”ID x 5/16” Spacers (Upper Actuator Bracket)
(2) ¼-20 X 2” Chrome Allen Bolt w Nylock (actuator mounts)

NOTE: Aluminum Actuator Brackets are Drilled Out for ¼-20 Bolt!